THE ROCKET MOTOR
—It's Future Uses

By LESTER D. WOODFORD, '33.

This is the third of a series of articles on Rocket Motors by Mr. Woodford. The first article of the series traced the history and development of the rocket. The second explained some of the elementary working principles of the Rocket Motor. In this third and last of the series, the author predicts some of the future uses of Rocket Motors.
—THE EDITOR.

EXPERIMENTATION with the rocket motor has proven one thing conclusively, that it can be used only to propel machines at an extremely high rate of speed. In reality, it has its own definite field of service, for it does not seem probable that it can be used either for water or land travel.

This leaves only one field open to its use, that of travel above the earth. A new type of aircraft must be developed to contain this motor for even the strongest of present day airplanes would be unable to withstand the strain that the rocket's mighty horsepower would place upon it. A new branch of aeronautics is now in the process of organization, that of "Rocket Planes."

The rocket plane will be stronger and heavier than its younger brother, for with the rocket motor, there will be horse-power to spare. It must be built entirely of metal, for with the sparks from the exhaust streaming out behind, the ordinary "doped" fabric would be impractical. Cabins must be air-tight and well-insulated against the cold temperatures that the ships will encounter at an altitude of thirty miles or more above the earth. A speed of 5,000 miles per hour will be possible at this thirty-mile altitude for here the air pressure is only one one-thousandth of that at sea level. At ten miles altitude, where the pressure is only one-tenth of that at sea level, the rocket planes will only be able to "crawl" through the air at a modest speed of 500 miles per hour. Air resistance will be minimized by using collapsible wings which can be drawn in as altitude is gained and run out again when the ship is ready to land.

The highest theoretical efficiency point for the rocket motor is when the motor is moving through the air at a rate of speed equal to that of the gasses that are being expelled. The energy given to the ship is formed by expanding gases, resulting from the combustion of the fuels, and consequently, for highest efficiency in fuel consumption, energy efficiency must be secured.

Dr. Goddard found, during his experiments in 1929, that gases having a nozzle velocity of 2,000 to 3,000 feet per second yielded only 15 to 20 per cent of the energy of the fuel, while if the nozzle velocity were to be augmented to 6,000 to 8,000 feet per second, efficiency would increase to 60 or 70 per cent.

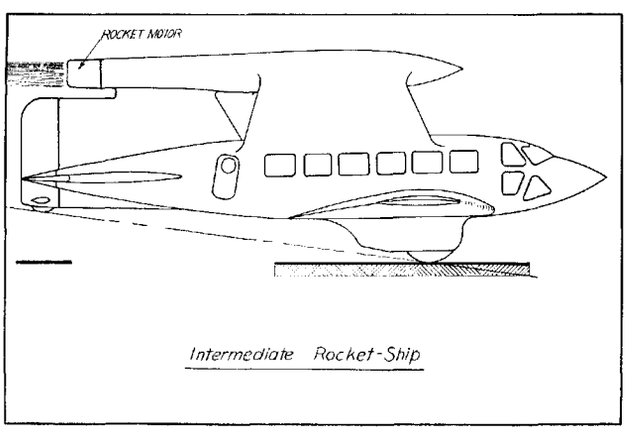
When the rocket plane is travelling at a speed of 25 miles per hour it uses only 1.2 per cent of the fuel's energy, at 65 miles per hour, 2.8 per cent; and at 350 miles per hour, only 13 per cent. We may see then, that the greater the speed at which the rocket plane travels, the greater the efficiency that can be realized.

In the huge rocket transport planes, the motors will probably be placed in the trailing edge of the wings, in the intermediate type, above the fuselage, and in the small, swift racing planes, in the rear of the fuselage. (See drawing.)

A Look Into the Future

Let us now take a look into the future, for example, in the year 1947, when these speedy planes will have become an "everyday affair." Although there may not be as many rocket planes as there are airplanes today, the total capital invested in them, and the number of passengers that they will transport and freight that they will carry, will be much greater.

The trans-oceanic liner, will be built in dimensions that are difficult to imagine. The Ford tri-motor transport, which today seems to be huge, will be able to taxi between the landing wheels of this future giant, and have sufficient space for two Boeing "Fighters" on either side. The general design will be comparable to the "flying wing" type of aircraft, with a wing span of around 900 feet. The fuselage, in this case a mere structure to furnish a mount-



Intermediate Rocket Ship

The Ohio State Engineer

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ing for the tail surfaces, will have an overall length of 500 feet.

The motors (rocket type), developing 5,000 horse power each, will be placed along the trailing edge of the wing, at intervals of ten feet. There will be around forty of these motors producing a total of 200,000 horse power. This will vary, of course with the pay load that the plane will carry, and the distance it will travel.

This trans-oceanic plane will travel around the world, stopping only at points like New York, San Francisco, Tokio, Berlin, Paris and London. Smaller planes will connect outlying cities with these terminals. In this manner, the entire world will be covered with a network of fast rocket plane transportation lines, that will enable a person to travel any place on the earth within 24 hours. He will then be able to reside hundreds of miles from his place of business, and yet reach it in less time than it now takes to ride downtown on the street car.

In time, most of the residential districts will be situated far from the smoke and noise of the cities. Architects will re-design these cities to contain only large buildings, spaced far apart, and with beautiful parks between them. In the center, there will be a landing field for the commuters from which they can reach their offices within a few minutes.

Let us now take a trip in one of these fast planes. We will imagine that we live in Ohio, and are planning a flight to Berlin. First, we will climb into the family rocket ship and hop to New York, making this distance, in approximately six minutes! Then, we will secure passage on the trans-oceanic air liner, that is scheduled to leave at midnight. Although the trip only takes two hours, it will be seven o'clock in the morning when we land in Berlin. Upon returning to New York, however, we would leave Berlin at noon and land in the United States at 8 a. m. on the same day!

As the rocket ship is perfected, and its motor operated with a greater degree of efficiency, interplanetary travel will be experimented with. Space ships will be constructed, that will be ten, and even fifteen, times the size of the present day transport. They will be built with all of the luxury and size of the most palatial of ocean liners, and will be fitted with state rooms, dining halls, dance floors, and elevators. The power of the rocket motor, with its almost unlimited future, will pick up the thread of Aviation's development where it is bound to be dropped by the gasoline motor, and carry it to new and spectacular heights. The great mystery, "The Solar System," and even the unbound ethereality of the "heavenly constellations," will become part of the knowledge, and not of the theories, of Science.

If we have to, there are many things we can do which otherwise might seem impossible. The following incident is cited as an example. A dog was caught in a gate. Several civilians tried unsuccessfully to release the animal. Three policemen were called and with a crowbar and other instruments they endeavored to free the dog. Just as they were ready to give op, a cat ran in front of the dog. With a convulsive wiggle, the canine leaped out of the gate and gave chase to the cat. The accumulated ingenuity and resourcefulness of modern business will surely supply the cat which can entice the economic dog from the grip of depression. Do you feel catty?

—*The Hercules Mixer.*

The 1903 Paige roadster, states Pete Keenan, in the October issue of the *Automobile Trade Journal,* was equipped with a motor whose crankshaft rotated counterclockwise. It was cranked backwards. We recommend it for southpaws.